REMARKS

Claims 1, 2, 8, 30, 32-36, and 38-40 have been amended. Claims 31, 37, and 41 have been cancelled. Claims 1-30, 32-36, and 38-40 are pending in the application. Applicant reserves the right to pursue the original claims and other claims in this and other applications.

Claims 1, 8-11, 30-34, and 36-41 stand rejected under 35 U.S.C. 102(e) as being anticipated by Takayama et al. (U.S. Patent No. 6,683,643). Claims 2-5, 12, and 13 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Takayama in view of Bakhle et al. (U.S. Patent No. 6,061,092). The rejections are respectfully traversed.

Claim 1 recites an image processing apparatus comprising "a storage system for storing first data corresponding to at least one actual image and second data corresponding to at least one of at least one dark current reference image and at least one white reference image captured by a pixel array; and a processor coupled to said storage system for compensating said first data using said second data, wherein said storage system stores a plurality of gain conditions and a plurality of exposure times associated with said first data and a plurality of gain conditions and a plurality of exposure times associated with said second data."

Claim 8 recites a method for pixel compensation comprising "capturing, using a pixel array, first data corresponding to one of at least one dark current reference image and at least one white reference image; storing reference data corresponding to said one of said at least one dark current reference image and said at least one white reference image in a storage system, said storage system storing a plurality of gain conditions and a plurality of exposure times associated with said first data; capturing, using a pixel array, at least one actual image; storing second data corresponding to said at least one actual image in said storage system, said storage system storing a plurality

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of gain conditions and a plurality of exposure times associated with said second data; and compensating said second data using said reference data."

Claim 30 recites a digital camera system comprising "a dark current and defective pixel compensation circuit for compensating first data corresponding to an actual image; and an image processor coupled to said dark current and defective pixel compensation circuit for forwarding said first data from said image sensor to said dark current and defective pixel compensation circuit, wherein the dark current and defective pixel compensation circuit includes a storage system, coupled to a processor via a bus, for storing said first data corresponding to said actual image and second data corresponding to at least one of at least one dark current reference image and at least one white reference image captured by said image sensor, said storage system storing a plurality of gain conditions and a plurality of exposure times associated with said first data and a plurality of gain conditions and a plurality of exposure times associated with said second data."

Claim 33 recites a computer system having an imaging device comprising "a storage system for storing first data corresponding to at least one actual image and second data corresponding to one of at least one dark current reference image and at least one white reference image captured by a pixel array; and at least one second processor coupled to said storage system for compensating said data corresponding to said actual image, wherein said storage system stores a plurality of gain conditions and a plurality of exposure times associated with said first data and a plurality of gain conditions and a plurality of exposure times associated with said second data."

Claim 34 recites an image processing apparatus comprising "a storage system for storing first data corresponding to a plurality of actual images and data corresponding to a plurality of dark current reference images and a plurality of white

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reference images captured by a pixel array; and a processor coupled to said storage system for compensating said first data using said second data, wherein said storage system stores a plurality of gain conditions and a plurality of exposure times associated with said first data and a plurality of gain conditions and a plurality of exposure times associated with said second data."

Claim 36 recites a digital camera system comprising "a dark current and defective pixel compensation circuit for compensating first data corresponding to an actual image; and an image processor coupled to said dark current and defective pixel compensation circuit for forwarding said first data from said image sensor to said dark current and defective pixel compensation circuit, wherein the dark current and defective pixel compensation circuit includes a storage system, coupled to a processor via a bus, for storing said first data corresponding to said actual image and second data corresponding to at least one of at least one dark current reference image and at least one white reference image captured by said image sensor, said storage system storing a plurality of gain conditions and a plurality of exposure times associated with said first data and a plurality of gain conditions and a plurality of exposure times associated with said second data."

Claim 38 recites a computer system having an imaging device comprising "a storage system for storing first data corresponding to at least one actual image and second data corresponding to one of at least one dark current reference image and at least one white reference image captured by a pixel array; and at least one second processor coupled to said storage system for compensating said data corresponding to said actual image, wherein said storage system stores a plurality of gain conditions and a plurality of exposure times associated with said first data and a plurality of gain conditions and a plurality of exposure times associated with said second data."

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Claim 39 recites a dark current and defective pixel compensation circuit comprising "a storage system, coupled to said at least one processor via said bus, for storing first data corresponding to said at least one actual image and second data corresponding to said at least one dark current reference image and said at least one white reference image captured by said image sensor, said storage system storing a plurality of gain conditions and a plurality of exposure times associated with said first data and a plurality of gain conditions and a plurality of exposure times associated with said second data."

Claim 40 recites an integrated circuit comprising "a dark current and defective pixel compensation circuit for compensating first data corresponding to an actual image; and an image processor coupled to said dark current and defective pixel compensation circuit for forwarding said first data from said image sensor to said dark current and defective pixel compensation circuit, wherein the dark current and defective pixel compensation circuit includes a storage system, coupled to a processor via a bus, for storing said first data corresponding to said actual image and second data corresponding to at least one of at least one dark current reference image and at least one white reference image captured by said image sensor, said storage system storing a plurality of gain conditions and a plurality of exposure times associated with said first data and a plurality of gain conditions and a plurality of exposure times associated with said second data."

Applicant respectfully submits that Takayama and Bakhle fail to disclose every limitation of claims 1, 8, 30, 33, 34, 36, and 38-40. Takayama relates to a system for detecting and correcting defective pixels for a charge coupled device (CCD) image sensor. Takayama discloses that these pixel defects are represented by both white flaws and black flaws. (Takayama, col. 1, ll 17-27) Takayama explains that white flaws occur when "signals in which excessive signal components are added to output signals which

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are supposed to be outputted in accordance with luminance of a subject are outputted accidentally to make an image to be whitish." (Takayama, col. 1, ll 17-27) Takayama also explains that black flaws occur when "signals in which certain signal components are subtracted from output signals which are supposed to be outputted in accordance with luminance of a subject are outputted accidentally to make an image to be blackish." (Takayama, col. 1, ll 17-27)

Applicant respectfully submits that Takayama does not disclose, teach, or discuss, at least the limitations of capturing and storing dark current reference images as recited by claims 1, 8, 30, 33, 34, 36, and 38-40. Dark current "refers to an undesired signal generated by a pixel of an imaging device even in the absence of a light signal." (Specification, ¶ [0002]) Applicant respectfully submits that capturing and storing dark current reference images, as recited in claims 1, 8, 30, 33, 34, 36, and 38-40, is not the same Takayama's capturing and storing of defective pixels having white or black flaws. As such, Takayama fails to disclose every limitation of claims 1, 8, 30, 33, 34, 36, and 38-40. Applicant respectfully requests that the rejection under 102(e) be withdrawn.

Bakhle relates to a system for caching dark images of a complementary metal oxide semiconductor (CMOS) image sensor in a database. Bakhle discloses using a stored dark image to perform a dark fixed pattern noise cancellation process on a stream of video frames. (Bakhle, col. 2, ll 39-54) Moreover, Bakhle's system eliminates dark fixed pattern noise (DFPN) for tethered CMOS sensor-based digital video cameras supported by supplying and maintaining a host-based dark image cache." (Bakhle, Abstract) Specifically, Bakhle discloses that the camera is tethered to a host computer system such as a PC, [and] ... takes advantage of the storage and processing capabilities of the host to manage the cache." (Bakhle, Abstract)

Although the Office Action combines Bakhle and Takayama, one of ordinary skill in the art would not have been motivated to combine these references. Bakhle, specifically, discloses a system for CMOS image sensors; whereas, Takayama discloses a system for CCD image sensors. In fact, Bakhle states that "[d]igital imaging sensors using complementary metal oxide semiconductor (CMOS) technology in video and still cameras are replacing imaging sensors using charge coupled devices (CCDs)." (Bakhle, col. 1, ll 13-17) Therefore, Bakhle system was specifically geared towards CMOS image sensors and one of ordinary skill would not have been motivated to combine Bakhle's system with a system geared to CCD image sensors, such as Takayama's.

Further, Bakhle's system relates to video cameras; whereas, Takayama's system is specific to still cameras. Bakhle's system is dependant upon a host computer system, but Takayama's does not disclose a system dependant upon a host computer system. Applicant respectfully submits that these are fundamental differences in the application. Absent hindsight, one of ordinary skill would not have been motivated to combine these references to produce the inventions of claims 1, 8, 30, 33, 34, 36, and 38-40. Accordingly, Applicant respectfully requests that the rejection under 103(a) be withdrawn and claims 1, 8, 30, 33, 34, 36, and 38-40 be allowed.

Claims 2-5 depend from claim 1 and are allowable for at least the same reasons. Claims 9-13 depend from claim 8 and are allowable for at least the same reasons. Claims claim 32 depends from claim 30 and is allowable for at least the same reasons. Applicant respectfully requests the withdrawal of the rejections and allowance of the claims.

Claims 6, 7, 14, 15, 20-24, and 35 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Takayama in view of Bakhle and further in view of Houchin et al. (U.S. Patent 5,047,861). The rejection is respectfully traversed.

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Claims 6 and 7 depend from claim 1 and contain similar limitations. Claims 14, 15, and 20-24 depend from claim 8 and contain similar limitations. For at least the reasons previously discussed, Takayama and Bakhle fail to disclose, teach, or suggest every limitation of claims 6, 7, 14, 15, and 20-24.

Claim 35 contain similar limitations as claim 1. That is, claim 35 recites an image processing apparatus comprising "a storage system for storing first data corresponding to at least one actual image and second data corresponding to at least one dark current reference image and at least one white reference image captured by a pixel array; and a processor coupled to said storage system for compensating said first data using said second data, wherein said storage system stores a plurality of gain conditions and a plurality of exposure times associated with said first data, said storage system further stores a plurality of gain conditions and a plurality of exposure times associated with said second data, and said storage system processor further stores light condition information for said second data." As such, Takayama and Bakhle fail to disclose, teach, or suggest every limitation of claim 35.

Applicant respectfully submits that Houchin fails to cure the deficiencies of Takayama and Bakhle discussed above. Houchin relates to a system for correcting an image. Houchin discloses "a single, programmable look-up table, and a method for programming the table, which allows many corrections and conversions to be performed in one look-up table operation." (Houchin, col. 2, ll 27-31) Houchin does not disclose or suggest "a storage system for storing first data corresponding to at least one actual image and second data corresponding to at least one dark current reference image and at least one white reference image captured by a pixel array; and a processor coupled to said storage system for compensating said first data using said second data, wherein said storage system stores a plurality of gain conditions and a plurality of exposure times associated with said first data, said storage system further stores a

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plurality of gain conditions and a plurality of exposure times associated with said

second data, and said storage system processor further stores light condition

information for said second data," as recited by claim 35 and similarly, claims 6, 7, 14,

15, and 20-24. Applicant submits that the cited combination fails to disclose, teach, or

suggest every limitation of 6, 7, 14, 15, and 20-24. As such, Applicant respectfully

requests the withdrawal of the rejection and allowance of the claims.

Claims 16-19 and 25-29 stand rejected under 35 U.S.C. 103(a) as being

unpatentable over Takayama, Bakhle and Houchin in view of Baharav et al. (U.S.

Patent No. 6,737,625). The rejection is respectfully traversed.

Claims 16-19 and 25-29 depend from claim 8 and contain similar limitations.

For at least the reasons previously discussed, Takayama, Bakhle, and Houchin fail to

disclose, teach, or suggest every limitation of claims 16-19 and 25-29. Baharav fails to

cure the deficiencies of Takayama, Bakhle, and Houchin discussed above. Baharav

discloses a system for detecting and correcting bad pixels in an image sensor. Baharav

fails to disclose, teach, or suggest "capturing, using a pixel array, first data

corresponding to one of at least one dark current reference image and at least one white

reference image; storing reference data corresponding to said one of said at least one

dark current reference image and said at least one white reference image in a storage

system, said storage system storing a plurality of gain conditions and a plurality of

exposure times associated with said first data; capturing, using a pixel array, at least

one actual image; storing second data corresponding to said at least one actual image in

said storage system, said storage system storing a plurality of gain conditions and a

plurality of exposure times associated with said second data; and compensating said

second data using said reference data," as recited by claims 16-19 and 25-29. Applicant

submits that the cited combination fails to disclose, teach, or suggest every limitation of

16-19 and 25-29. As such, Applicant respectfully requests the withdrawal of the rejection and allowance of the claims.

In view of the above, Applicant believes the pending application is in condition for allowance.

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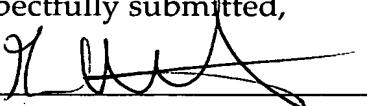
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